



**MANGALORE UNIVERSITY**  
**Department of Physics**  
**MSc Physics**

**PHS 507 : ELECTRONICS II**

**(52 Hrs.)**

**Course outcome**

CO1 Good understanding of Transmission lines.

CO2 Good understanding of Wave guides and antenna.

CO3 Will be exposed to Analog modulation and demodulation.

CO4 Will have good exposure on microwave devices and satellite communication.

Unit I **Transmission lines**

Distributed parameters, types of transmission lines, calculation of line parameters. Inductance and capacitance of parallel round conductors, coaxial cables. Voltage, current and impedance relations. Characteristic impedance, reflection coefficient, propagation constant. Line distortion and attenuation. Line parameters at high frequencies, Line termination. Standing wave ratio. Quarter and half wavelength lines. Impedance matching, quarter wave transformer, stub matching. Smith chart and its applications. [13 hrs]

Unit II **Wave guides and antenna**

Basic concepts, guided waves between parallel planes. TE & TM waves. Rectangular wave guides. Qualitative treatment of circular wave guides, comparison with coaxial cable, wave guide coupling. Matching and attenuation, cavity resonators. Directional couplers,

Electromagnetic radiation, elementary doublet, current and voltage distribution, resonant and non resonant antennas, radiation pattern, antenna gain, effective radiated power, antenna resistance, bandwidth, beam width, polarisation, grounded and ungrounded antennas. Effect of antenna height. Microwave antennas. [13 hrs]

Unit III **Analog modulation and demodulation**

Need for modulation, AM generation, power and bandwidth calculations. FM generation, power and bandwidth calculation. AM & FM transmitters (block diagram).

Demodulation: receivers for AM & FM signals. AVC & AFC circuits. Pre-emphasis and De-emphasis. Digital modulation: sampling theorem, PAM, PDM, PPM system comparison. PCM technique. ASK, FSK, PSK & QPSK systems [13 hrs]

Unit IV **Microwave devices and Satellite communication** (qualitative)

Multicavity klystron, reflex klystron, parametric amplifiers, Gunn diode, Microwave transistors & FETs.

Communication subsystems, description of the communication system transponders, spacecraft antennas, frequency reuse antennas, multiple access schemes, frequency division multiple access, time division multiple access, code division multiple access. Tracking geostationary satellites. Examples of satellite communication systems - IRS & INSAT series [13 hrs]

**Reference Books:**

1. Ryder J D, 'Networks, Lines and Fields' II Edn. (PHI, 1997)
2. Tomasi Wayne, 'Electronic Communication Systems', (Pearson Education Asia, 2001)
3. Kennedy and Davis, 'Electronic Communication Systems', IV Edn. (Tata McGraw Hill, 1993)
4. Dennis Roddy and John Coolen, 'Electronic Communications', IV Edn. (PHI, 1995)
5. Kraus & Fleisch, 'Electromagnetics with Applications', V Edn. (McGraw Hill, 1999)
6. Taub & Schilling, 'Principles of Communication System', II Edn. (McGraw Hill, ISE, 1986)
7. Liao S Y, 'Microwave Devices and Circuits', III Edn. (PHI)
8. Roddy D, 'Satellite Communications', III Edn. (McGraw Hill, 2001).

